

AD_____

Award Number: MIPR 9GBWAL9998

TITLE: Teledermatology

PRINCIPAL INVESTIGATOR: Doctor Hon Pak
Doctor Kathleen David-Bajar
Lisa L. Smith-Cruz

CONTRACTING ORGANIZATION: Brooke Army Medical Center
Fort Sam Houston, TX 78234-6200

REPORT DATE: January 2000

TYPE OF REPORT: Final

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
Distribution Unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

20011005 267

REPORT DOCUMENTATION PAGEForm Approved
OMB No. 074-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

| | | | | |
|---|---|--|--|----------------------------------|
| 1. AGENCY USE ONLY (Leave blank) | | 2. REPORT DATE January 2000 | 3. REPORT TYPE AND DATES COVERED Final (15 Apr 99 - 31 Dec 99) | |
| 4. TITLE AND SUBTITLE Teledermatology | | | 5. FUNDING NUMBERS MIPR 9GBWAL9998 | |
| 6. AUTHOR(S) Doctor Hon Pak Doctor Kathleen David-Bajar Lisa L. Smith-Cruz | | | | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Brooke Army Medical Center Fort Sam Houston, TX 78234-6200 E-Mail: lisa.cruz@cen.amedd.army.mil | | | 8. PERFORMING ORGANIZATION REPORT NUMBER | |
| 9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research and Materiel Command Fort Detrick, Maryland 21702-5012 | | | 10. SPONSORING / MONITORING AGENCY REPORT NUMBER | |
| 11. SUPPLEMENTARY NOTES | | | | |
| 12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution Unlimited | | | | 12b. DISTRIBUTION CODE |
| 13. ABSTRACT (Maximum 200 Words) Teledermatology provides better access to care for the patient, a short turn around time for replies from the dermatologist and a savings of time, costs and resources by eliminating the need to send the patient to the dermatologist. | | | | |
| 14. SUBJECT TERMS Teledermatology | | | | 15. NUMBER OF PAGES 15 |
| | | | | 16. PRICE CODE |
| 17. SECURITY CLASSIFICATION OF REPORT Unclassified | 18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified | 19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified | 20. LIMITATION OF ABSTRACT Unlimited | |

Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the U.S. Army.

__X__ Where material from documents designated for limited distribution is quoted, permission has been obtained to use the material.

X Citations of commercial organizations and trade names in this report do not constitute an official Department of Army endorsement or approval of the products or services of these organizations.

N/A In conducting research using animals, the investigator(s) adhered to the "Guide for the Care and Use of Laboratory Animals," prepared by the Committee on Care and use of Laboratory Animals of the Institute of Laboratory Resources, national Research Council (NIH Publication No. 86-23, Revised 1985).

N/A For the protection of human subjects, the investigator(s) adhered to policies of applicable Federal Law 45 CFR 46.

N/A In conducting research utilizing recombinant DNA technology, the investigator(s) adhered to current guidelines promulgated by the National Institutes of Health.

N/A In the conduct of research utilizing recombinant DNA, the investigator(s) adhered to the NIH Guidelines for Research Involving Recombinant DNA Molecules.

N/A In the conduct of research involving hazardous organisms, the investigator(s) adhered to the CDC-NIH Guide for Biosafety in Microbiological and Biomedical Laboratories.

Dr. Hon Pak

Mentor – Signature Date

Table of Contents

| | |
|-----------------------------------|---|
| Cover..... | 1 |
| SF 298..... | 2 |
| Foreword..... | 3 |
| Table of Contents..... | 4 |
| Introduction..... | 5 |
| Body..... | 5 |
| Key Research Accomplishments..... | 7 |
| Conclusions..... | 7 |
| References..... | 8 |
| Appendices..... | 9 |

Introduction:

The GPRMC Teledermatology Research Project uses a secure web based consult system to provide dermatology support to outlying, remote health care providers in the TriCare CONUS Area of Responsibility, therefore reducing lost duty time and decreasing costs of transportation and per diem. Teledermatology consults have been received from Ft's. Leavenworth, Leonardwood, Polk, and Hood. Plans are underway to extend this service to Ft. Huachuca and Ft. Sill, and Ft. Sam Houston.

This initiative will encompass establishing a single point of contact at the Regional level for all Teledermatology issues to include coordination of quality assurance for the headquarters and participating subordinate Medical Treatment Facilities (MTFs) of the GPRMC. The work will be performed at the Brooke Army Medical Center, Dermatology Department.

BODY:

Improve the access of patients to services throughout the region by providing access to a dermatologist.

Improve access of patients to dermatology services throughout the region.

Educate medical staff on use of telemedicine that may be applied in theater / battlefield / peacekeeping applications.

Clinically monitor effects of dermatology treatment using telemedicine.

Reduce travel time and costs for providers, patients, and family members.

Reduce cost by eliminating the need for contract dermatologist services.

Minimize the amount of lost duty days.

Patient

Family member/escort

Test equipment to gain valuable knowledge of use and / or practicability in effective theater / battlefield / peacekeeping applications.

Assess ability to diagnose and treat quickly using telemedicine.

APR-MAY99:

It has been determined that through the use of Teledermatology, a savings of travel dollars, as well as per diem and time lost by patient and patient's family escort has been achieved. Initial installation of PC's provided by TATRC for this project was achieved at three installations; Ft's Leavenworth, Leonardwood, and Polk. Consults were slow to begin with, but soon we were receiving 5-10 consults per week from each location. As cost of equipment is low, and a basic LAN or T-1 line already exists at each facility, web access was accomplished with no problems.

Created Consult Manager User Guide (Attachment II)

JUN99

Introduced weekly Dermatology Newsletters to remote facility Consult Physicians and Consult Managers. This newsletter addressed problems and solutions within the web system, as well as questions and answers. There remains a problem with Consult Managers training additional personnel on use of digital camera and web system, as there are many troops on deployment, PCS, or on leave. 18 consults, 4 registered users.

JUL99

Only have two dermatologists on staff at this time. Problems are being discovered using macro lens and improper lighting procedures. Suggestions included disabling auto flash on camera, and not using the macro lens. Weekly consults are not being submitted. One staff dermatologist has suggested honoring each Physician in Charge and the Consult Manager at each facility with a certificate of Contribution. GPRMC will think about this.

AUG99

Bulletin Board Service (BBS) Pass word changes to meet new security requirements. Disaster in the form of all data lost from web server. The server crashed, and all data for GPRMC was lost. There has been no backup of this system done by TATRC since the projects' inception.

SEP99

Remote facilities and in-house dermatologists remain upset and frustrated over loss of data on the web server. Work with web programmer at TATRC, attempting to recreate some, if not all consults. Experienced problems with BBS. When I try to access, I get a message that my account has not been created. When I try to re-register I get a message that my account already exists. SQL Server failure, system inaccessible for 1 day. TriCare Telederm meeting.

OCT99

Morale and faith in the Teledermatology web-based system continues to be low. Attempts to recreate consults are still an ongoing process. So far, images and consults have been recovered, but cannot be matched up together. Experienced difficulty with remote areas uploading and sending consults. Questions were raised whether my position was funded for travel. Project administrator from TATRC informed GPRMC that \$5,000 was provided to each MEDCEN for local travel. Received request from Ft Leonardwood to receive training by one of BAMC's dermatologists on dermoscopes for images; however, the Chief of Dermatology declined, as it would take more than a few days to cover all the dimensions of using a dermascope. . None of the participants from the other regions knew of any use of a dermascope

NOV99

We are re-uploading missing consults using the information contained on the patients' SF513.

ACTION ITEM:

* Need Local Project Managers to provide SF513s from ALL of their Clinical Consults from 1 May 1999 up through 8 November.

Information requested from Consult Managers was as follows: to provide SF513's from 1 May to 8 November 99.v This action was completed and most consults were completed in a short time. Some images could not be re-established. This demonstrates the necessity of performing system backups and testing of system backups to ensure they work properly at all times.

DEC 99

2 consults 2 new users.

Key Research Accomplishments

- Provided remote caretakers with the ability to request Teledermatology consult anywhere internet access is available
- Reduced costs (Per Diem and Travel) by avoiding sending patient to dermatologist. Also avoided TRICARE network consultation costs.
- Improved access to dermatology services for Patient and Provider. Development of secure web based Teledermatology Consult system using Cold Fusion.
- Establishment of Dermatology Patient Consult Database.

Conclusions

Observations:

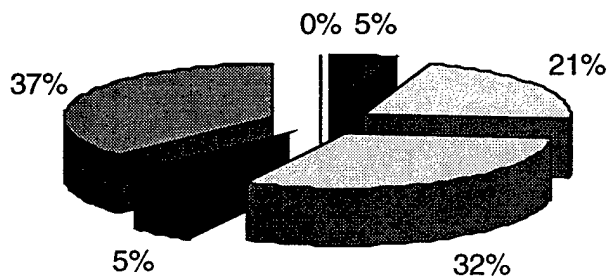
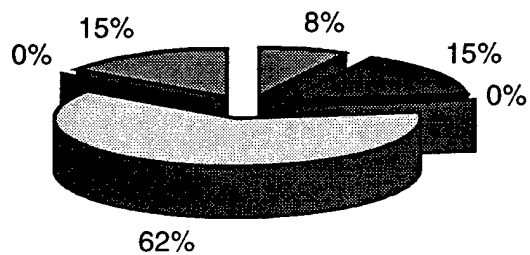
1. The clinicians at the local levels seem to view this project as an increased burden, due to the fact that previous procedures the Primary Care Clinician completed an SF513, and forwarded it to the TRICARE Contractor for scheduling and administrative tasks. With the Teledermatology System, the Primary care Clinician is responsible for completion of the consult, image acquisition, and patient follow-up, as well as care delivery. The impact on the Primary Care Clinician is an added task in an era where they are being pressured to increase productivity. Having one person at each facility assigned as Consult Manager was considered to be an honor at each facility. However, when the recognition of the time involved for taking images, and uploading them, along with patient history to the secure web server was realized, the project seemed to slow down a little more.
2. Initially users are enthusiastic and appreciative. With extensive use the administrative burden associated with Teledermatology results in a decline in use. A Drag & Drop system whereby information and images could be dropped into a bundle to be uploaded as a package would greatly enhance the user's interest, as less time would need to be spent going through each page on the web system.
3. The use of web technology supports the primary care mission beyond normal duty hours, and allows timely consult requests as well as responses. 24/7 access achieves availability with relatively minimal server downtime
4. The use of web technology allows access from any location due to web-based design. The insertion of minimal additional equipment (digital cameras, camera memory and digital card readers) contribute to the Cost-effectiveness of the project. This is a viable recourse which could have far-reaching ramifications in the way the Military conducts its medical business either in the field or in medical clinic or hospital.
5. In the beginning months, Command Level at each facility supported deployment of this technology, with the exception of Ft. Polk, as they already has an assigned dermatologist. However, Ft. Polk has used the system during periods when the dermatologist was not available (TDY, leave, etc.).
6. Problems such as improperly configured PC's and late arriving equipment were dealt with quickly, minimizing the impact on the project itself.
7. System is inflexible and does not allow for modification of site specific items without program modification from the developer.
8. The system runs well when the server and local LAN is running optimally, but too frequently slows down significantly(to a point where a new user may be disappointed and not use the system).
9. The additional effort required for a Teledermatology consult is not automatically recorded into the workload reporting systems for credit to the Primary Care clinic. Should this be made possible, the Clinic Directors will be more inclined to use the system.
10. Images are stored in jpeg form, which is not DICOM 3.0 compatible.
11. Some Jpeg images that are sent from each clinic seem to be come distorted. This may be due to loss of data during transmission.

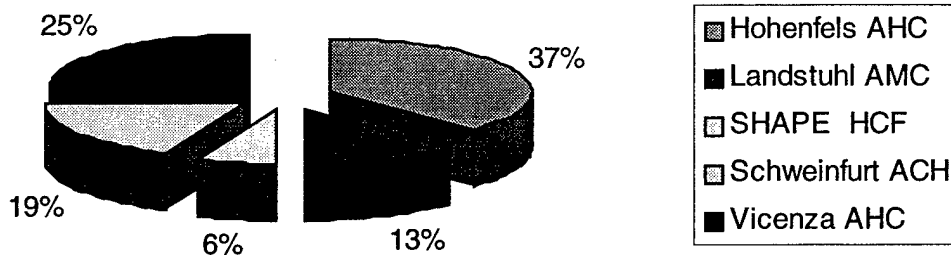
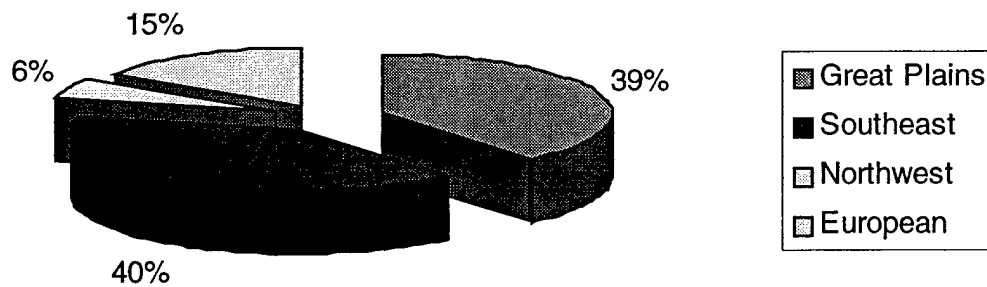
Recommendations:

1. Further programming is required for modification of site-specific items, as well as further developments in web-based programming
2. Web-based Forms need modification to decrease keyboard/mouse entry and improve human interface
3. An exploration of problems with LAN and WAN, as well as server congestion needs to be looked at to develop alternatives to ensure quick system response. We are not sure where the problem is. Perhaps we should look at the database and compression technology for the images.
4. Since Electronic patient records are becoming reality, we need to make this system DICOM and HL-7 compliant along with building an interface to the CHCS if we are to make this system a success.
5. Site selection should be based on a needs assessment.
6. The system MUST be streamlined, and made simpler. A drag and drop system, whereby the Consult Manager can do a one page patient information form, perhaps in PDF form, and drop that, along with the images, into a bundle to be transported to the receiving facility could be of significant interest.
7. Make all images DICOM compliant, to verify check image construction during transmission to remote point.
8. Suggest that color ink jet printers (readily available for under \$300 each) be made available to each MTF for documentation of patient images into patient records.

References

NONE





As you can tell from this chart, Southeastern and Great Plains experienced the greatest success with clinic usage and data gathering. Additional value information are on the following two pages:

Appendices (Attachment #1).

**AMEDD
Triservice Site Status Report**

As of 12 July 1999

| Region | Site Name | Update | Site | Reg. | Reg. | Consults | | Site(s) |
|---------------------|-------------------------------|--------|------|--------|------|-----------------------|-----------------------|------------------------|
| | | D/M | Code | ConMgr | Phys | Trainin g Total | Clinica l Total | Average #Consult/Wk |
| Southeastern | 1Blanchfield ACH | 29-Jun | BA | 1 | 0 | 1 | 0 | 0.2 |
| | Charleston AFB | 1-May | CA | 0 | 0 | 0 | 0 | 0 |
| | 2DDEAMC Ft Gordon | " | DD | 2 | 1 | 0 | 0 | 0 |
| | Fox AHC | " | FA | 0 | 0 | 0 | 0 | 0 |
| | Key West NBMC | " | KW | 0 | 0 | 0 | 0 | 0 |
| | Kings Bay NMC | " | KB | 0 | 0 | 0 | 0 | 0 |
| | 3L. Joel AHC Ft. McPherson | 6-Jul | LJ | 0 | 1 | 0 | 5 | 1 |
| | 4Lyster ACH | 1-May | LA | 2 | 0 | 0 | 0 | 0 |

| | | | | | | | |
|---------------------|--------|----|---|---|---|----|-----|
| MacDill AFB | " | MD | 0 | 0 | 0 | 0 | 0 |
| Martin AHC Ft. | " | | | | | | |
| Benning | " | MA | 0 | 0 | 0 | 0 | 0 |
| 5Moncrief ACH Ft. | | | | | | | |
| Jackson | 14-Jun | MC | 8 | 2 | 0 | 11 | 2.2 |
| Moody AFB | 1-May | MB | 0 | 0 | 0 | 0 | 0 |
| NH Jacksonville | " | NJ | 0 | 0 | 0 | 0 | 0 |
| 6NH Roosevelt Roads | 29-Jun | RR | 0 | 1 | 0 | 2 | 0.4 |
| NHB Beaufort | 28-Jun | NB | 0 | 0 | 0 | 0 | 0 |
| 7NHC NAVSTA | 23-Jun | NH | 1 | 1 | 0 | 3 | 0.6 |
| Noble AHC | 1-May | NO | 0 | 0 | 0 | 0 | 0 |
| 8Patrick AFB | 30-Jun | PT | 2 | 2 | 0 | 7 | 1.4 |
| Robins AFB | 28-Jun | RA | 0 | 0 | 0 | 0 | 0 |
| Shaw AFB | 1-May | SH | 0 | 0 | 0 | 0 | 0 |
| US Southern HC | " | UC | 0 | 0 | 0 | 0 | 0 |
| Winn AHC Ft. | | | | | | | |
| Stewart | " | WA | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | |
|------------------|--|--|-----------|----------|----------|-----------|------------|
| Sub Total | | | 16 | 8 | 1 | 28 | 5.8 |
|------------------|--|--|-----------|----------|----------|-----------|------------|

Great Plains

| | | | | | | | |
|--------------------|--------|----|---|----|---|---|-----|
| 9Bliss AHC | 25-Jun | BL | 0 | 1 | 5 | 0 | 1 |
| 10Brooke AMC | 7-Jun | BK | 1 | 0 | 2 | 4 | 1.2 |
| Brooks AFB | 1-May | BS | 0 | 0 | 0 | 0 | 0 |
| Corpus Christi NA | " | CC | 0 | 0 | 0 | 0 | 0 |
| 11Darnell ACH | " | DA | 4 | 0 | 0 | 0 | 0 |
| Evans AHC | " | EV | 0 | 0 | 0 | 0 | 0 |
| Irwin AHC | " | IR | 0 | 0 | 0 | 0 | 0 |
| Lackland AFB | " | LD | 0 | 0 | 0 | 0 | 0 |
| 12Med Dept Act Ft. | | | | | | | |
| Leonardwood | 29-Jun | LW | 6 | 12 | 3 | 7 | 2 |
| 13Munson AHC | 15-Jun | MU | 7 | 1 | 0 | 2 | 0.4 |
| NAS Ingleside | 1-May | IN | 0 | 0 | 0 | 0 | 0 |
| NAS Kingsville | " | KI | 0 | 0 | 0 | 0 | 0 |
| Randolph AFB | " | RM | 0 | 0 | 0 | 0 | 0 |
| Reynolds AHC | " | RE | 0 | 0 | 0 | 0 | 0 |
| 14USMEDDAC Ft. | | | | | | | |
| Polk | 1-Jul | PO | 1 | 32 | 4 | 1 | 1 |
| William Beaumont | | | | | | | |
| ACH | 1-May | WL | 0 | 0 | 0 | | 0 |

| | | | | | | | |
|------------------|--|--|-----------|-----------|-----------|-----------|------------|
| Sub Total | | | 19 | 46 | 14 | 14 | 5.6 |
|------------------|--|--|-----------|-----------|-----------|-----------|------------|

Northwest

| | | | | | | | |
|----------------|-------|----|---|---|---|---|-----|
| 15Everett NBMC | 25/6 | ET | 0 | 0 | 2 | 0 | 0.4 |
| Fairchild AFB | 1-May | FR | 0 | 0 | 0 | 0 | 0 |
| 16Madigan AMC | 1-May | MG | 0 | 0 | 0 | 0 | 0 |
| 17McChord AFB | 1-May | MR | 5 | 2 | 0 | 0 | 0 |

| | | | | | | | | |
|------------------|-------------------|-------|----|-----------|-----------|-----------|-----------|-------------|
| | 18NH Bremerton | 21/5 | BT | 1 | 0 | 1 | 0 | 0.2 |
| | 19NH Oak Harbor | 14/6 | OH | 4 | 5 | 0 | 1 | 0.2 |
| | Umatilla AHC | 1-May | UM | 0 | 0 | 0 | 0 | 0 |
| Sub Total | | | | 10 | 7 | 3 | 1 | 0.8 |
| European | | | | | | | | |
| | 20Hohenfels AHC | 25/6 | HO | 6 | 2 | 2 | 0 | 0.4 |
| | 21Landstuhl AMC | 1-May | LR | 2 | 2 | 0 | 0 | 0 |
| | 22Schweinfurt ACH | 7-Jul | SC | 3 | 5 | 0 | 6 | 1.2 |
| | 23SHAPE HCF | 15/6 | SA | 1 | 7 | 1 | 2 | 0.6 |
| | 24Vicenza AHC | 1-May | VI | 4 | 3 | 0 | 0 | 0 |
| Sub Total | | | | 16 | 19 | 3 | 8 | 2.2 |
| TOTAL | | | | 61 | 80 | 21 | 51 | 14.4 |

Notes:

1. # = an Active Site (24/51 sites)
2. As of 1 May 1999 the Average # of Consults transmitted/site is: **3**
(a.) Calculation for Average # of Consults transmitted per Site is: $=\text{SUM}(\text{E89} + \text{F89})/24$
3. Calculation for Average # of Consults per Work Week is: $=\text{SUM}(\text{E}\#, \text{F}\#)/5$.
(a.) Based on a 5 Day Work Week.
4. Update D/M is the Day/Month of consult activity.

Brooke Army Medical Center
Teledermatology Project

Consult Manager Use Only

Published 5-18-99

CONSULT MANAGER NAME:

LOG IN:

Password: